SIRIUS ASTRONOMER

NEWSLETTER OF THE ORANGE COUNTY ASTRONOMERS
See our web site at http://www.chapman.edu/oca/

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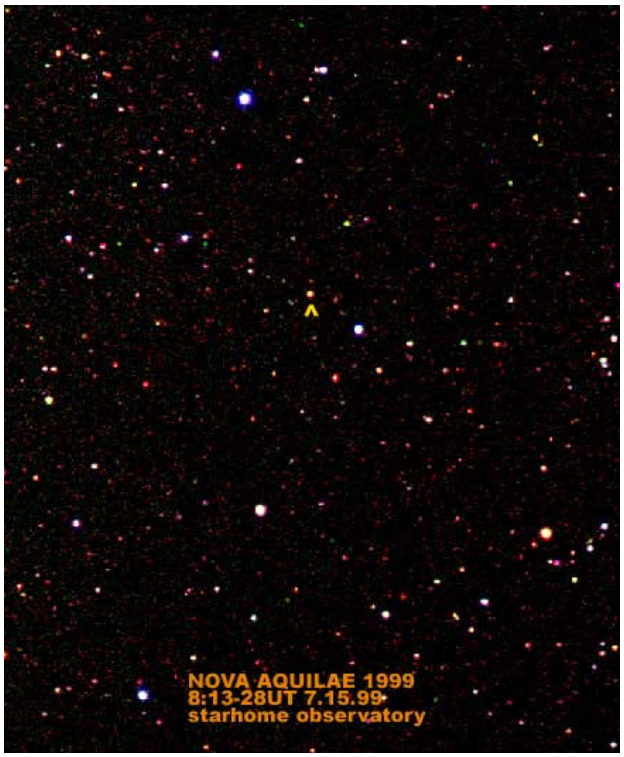


OCA Club member and former President John Sanford recently took this 10-minute exposure of newly-discovered Nova Aquilae with a 300mm lens camera. John reports the nova displays a distinctive pink color originating from the glowing hydrogen in the outer layer of the explosion.

CHAPMAN MEETINGS

The next meeting of the OCA is on Friday, August 13, at 7:30pm in the Science Hall of Chapman University in Orange. The free and open meeting will feature Chris Butler speaking on "Race to the Moon: the Untold Story." Also, Bob Gill will present "What's Up," and Russell Sipe will present "OCA Astro News."

STAR PARTIES

The SIlverado site will be open for observing on Saturday, August 7. The Anza site and Observatory will be open both August 7 and August 14. For weather information, check the satellite weather pictures before leaving town or call the observatory.

COMING UP

The "Explore the Stars" program will be held August 14 at Palomar mountain. Contact Russell Sipe for more details. Schedule change: the August Star-B-Que has been rescheduled for September to accommodate members travelling to eclipse-viewing locations. See p. 11 for more information.

President's Message

by Russell Sipe

In the foreground the Reuters news photo showed the countdown clock frozen at six seconds, in the background the *Columbia*, bearing the oft-delayed Chandra X-ray Observatory, sat bathed in floodlights. In Cambridge MA the Chandra Control team let out a huge sigh of disappointment. Another delay for Chandra. The event that caused the launch "cut off" turned out to be a faulty hydrogen level reading at the shuttle engine nozzles. Three days later the mission got off the ground, literally, with a deep throated earth-shaking roar, producing great relief for astronomers world wide. In only a few weeks our understanding of the universe will go into hyper-drive as Chandra will make possible more detailed studies of black holes, supernovas, and dark matter and increase our understanding of the origin, evolution, and destiny of the universe. Piece of cake, right? Although it has taken longer than expected to get Chandra "in the hunt" the wait will have been well worth it.

Recently my daughter and I participated in mock sea battles off Long Beach Harbor between four of the twelve tall ships that were in the Southland as part of the 150th anniversary of the California Gold Rush. The thing about large sailing ships is, they don't turn on a dime. Unlike the myriad of pleasure craft that sailed circles around the big ships that day, it takes advanced planning and time to turn these massive vessels. It was quite enjoyable watching the captain of the SS *Californian* as he maneuvered his ship, gauging the wind, outguessing the opponent, marshalling the crew, to bring his guns to bear.

So what does all this have to do with Orange County Astronomers? Just this: we are a large club, the largest local astronomy club in the country. Although we have the potential to pack a big wallop, we need to clearly define our targets and make the necessary course changes to bring those targets into our sights. It may take a ship as large as ours longer to set a course and reach our target, but I think the wait will be worth it.

As the new captain at the helm of the OCA I am proud to follow in the footsteps of my predecessors. I have a lot of ideas. But ideas are cheap. Making good ideas work is the real measure of success. I, along with the OCA board, will carry on the month to month routine that keeps the club operating. I will also be working with the board and other interested parties to plan for future projects with the dual vision of enabling OCA members to participate in real science on the one hand, and to reach out and grow the hobby on the other.

I recently returned from the Partners in Astronomy conference in Toronto. Although I was aware of several programs aimed at bringing new people, in particular youth, into the astronomy field, I was not aware of just how much was being done in this area. I have heard speeches and read articles in the past few years about the "graying of the hobby", about how the average age of an amateur astronomer is forty something and getting older every year. Well, I think the trend is changing. And I want OCA to be part of this great effort. Our current public star parties and our support of future Tessmann Planetarium programs provide teasers that create interest. For those who are interested in getting into the hobby we have our beginner's class that does a great job discussing telescopes and observing techniques. And our astrophysics group discusses and studies more advanced topics. But we need a more broad-based program designed to take the spark of interest in youth and adults and nurture it into a flame, a program that will bring all these elements together into a cornucopia of astronomical delights. You will be hearing more about this in the months ahead. Our target is in sight, prepare to "come about". Godspeed to Chandra. Godspeed to OCA.

"The Goodness of the Night Upon You"
Othello Act 1 Scene 2

Russell Sipe

The Use of Video in Amateur Astronomy

by John Sanford

Television has been used with telescopes since its earliest days. However, even during the solar eclipse in 1979, it took a large studio camera with its weight and bulk to show a view of the Sun and Moon from a rooftop at CNN. The arrival of smaller and smaller, and more sensitive cameras and camcorders in the 1980s has made video astronomy popular and widespread. Here I intend to review some of the uses you can make of your camcorder or small B&W camera.

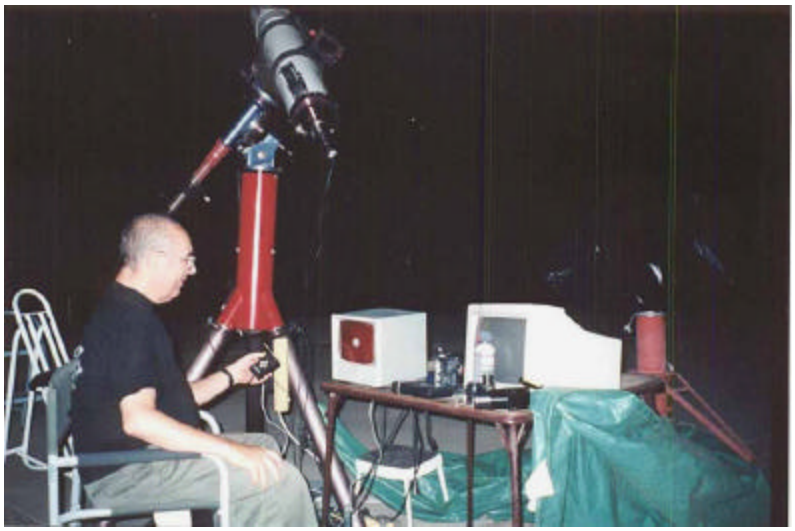
Let's take the camcorder first, as that is the equipment many people have. It doesn't matter too much what brand or model you have, but I will discuss the most recent ones later. Your camcorder will most probably have a fixed zoom lens which cannot be removed from the camera body. Therefore, we are limited to certain ways of using the device. I think use through a telescope can be accomplished without mounting the camera on the telescope. There is a method which I devised sometime in the 1960s called the "off telescope" method. It consists of setting a camera on a separate tripod, and adjusting the eyepiece tube so that the image exiting the eyepiece travels either directly at or directly away (depending on which side of the mount you are on). So instead of tracking across the film or video chip, the image simply slowly goes out of focus. Since your telescope isn't jiggled by touching anything moving, you can focus, shoot for a while, then refocus and shoot some more. This works well for still planetary and high scale lunar photography as well. Here's a picture of my new camcorder set up for eyepiece projection videography:

The technique here is first use a wide eyepiece, say a 40mm or 32mm and set your camcorder zoom on its widest setting. This to aquire the subject. Turn the autofocus function of the camera off. I had a camera which would (on auto) continually search for focus when looking through a telescope, which of course ruined the footage. Align the eyepiece/tube with the lens as well as possible, looking in two axes, i.e., from the top and then from the side. You may also want to move the camera in rotation and pan up or down to aquire the image. Once you have the planet or part of the Moon, which will appear very small in the small circle of field, you will need to zoom in on it. As you do that, the field will expand and the planet will increase in size. You may also want to put a shorter eyepiece to get more magnification. You will want to focus with the eyepiece by moving it in and out. Most focus just a little beyond visual focus. Zoom in until the planet is either larger than you want it, or you "run out" of light. Most modern camcorders have enough sensitivity to make an image that will appear at least an inch or two in diameter on a monitor (with Jupiter). You will probably want to have the date and time on for at least part of the footage, and most camcorders have this feature. Don't try to use the focus on the camcorder as it has little effect on the picture. It is also important to adjust the brightness and contrast on your playback monitor to maximize detail. Dark spots on the planet or Moon indicate the presence of dirt on one of the components of your system. Dirt on the projecting eyepiece is almost in focus, so you will need clean eyepieces and Barlows for projection work.

With the above setup, you should get images of the planets Jupiter and Mars that show more detail than the eye does, provided the seeing is good. Someone came up with the "Match Test for Seeing" where you go to the telescope and light a match. If it blows out go watch TV. If it stays lit with the flame not blowing around, start observing! This test works. Other uses: in its latest versions, the camcorder can be used for stellar astronomy in a limited way. My new Sony TRV-510 has the "Nightshot" feature and, more importantly, has a shutter that will go down to ¼ sec. The normal shutter speed for camcorders is 1/60 sec. So you can see the ¼ second speed is already 16 times as long. I have found this camera with slow shutter and its zoom all the way in to be able to pick up stars of about 7th magnitude. With the zoom out, sometimes the stars are too small to show well, so zoom in a little bit to start. Applications here might include occultation timing of bright stars and pictures of interesting conjunctions. Naturally, a tripod is a necessity. My previous camcorder, a Sony Hi8 of 1992 vintage reached about 4th magnitude zoomed in.

The new camera also has a still picture function which I am starting to explore. It has a "burst" function where it takes several frames in close succession and stores them. This sounds ideal for planetary work where the seeing only gives you a "keeper" some of the time. You can discard the blurry frames and then import the image into an image processing program to improve and then save. With the new Sony, the export of an image is done directly with no capture card needed.

Other uses of the camcorder: virtually all camcorders have a video in/out set of sockets. These are typically used with a patch cord to play recordings off your tapes. But, with video in, you can record from another video source as well. For several years, I have been selling small, very sensitive video cameras that will fit on almost any telescope. They are more sensitive by quite a lot than color camcorders and have multitudinous uses. A BNC cable run from one of these cameras and a monitor (or your camcorder's finder) is all you will need to get into serious video astronomy. I have used my little cameras for videotaping lunar occultations and graze timing occultations, double star observing, and lately, video guiding. You can investigate occultation observing on your own through IOTA. The video guiding is quite simple. First, what I want is to keep a star within an error box of about 10 arcsecs so that my 300 mm lens piggyback pictures will have round stars. I mount the camera on the side of the telescope and put the small 0.03 lux camera in the telescope (a 6-inch apo refractor). Then I boresight the camera and telescope so they both see the same field. Next, I look for a bright enough guidestar. It seems to be possible to guide on stars down to about 7th magnitude with the 6-inch. I find the guidestar on the tv screen (this may take some time) and center it in a circle of about 2 inches in diameter cut out of rubylith, which covers the video monitor screen except where the red layer is cut away. I can start the film exposure anytime once the star is centered in the field (which is about 1 arcmin in diameter). The human eye is excellent at centering things in such a field, and I can comfortably guide for 30 minutes or longer, making corrections when needed with the telescope mount's slow motion guiders. This beats squinting through a crosshair syspiece and the magnification can be enlarged to do more critical guiding. Here's a picture of that setup, which does not require a recorder of any kind, just the camera and monitor:



A camcorder with its rapid frame rate and 1/60 second exposure time just doesn't get enough photons to do muc in the way of deep sky imaging. If you need to do that in real time, I suggest use of an image intensifier with a video camera behind it. The OCA has had such a setup at Anza for some years, although it isn't used much (in fact it may be "lost"---do you have it?).

More uses of the camcorder: eclipses are an obvious event where results from a camcorder shine. The ability to record sound with the images is a huge bonus. Again, I recommend a tripod and manual focus when you pull off the solar filter at totality. Tracking across the sky isn't a necessity, although it's nice to have a stationary sun that stays in the middle of the frame and not having to adjust every few seconds makes for a much more professional video. Use a solar filter until the last few seconds before totality, then pull it off so you catch the "diamond ring" (if there is one). The very thin remnant of the sun will not harm the CCD chip, and it can't hurt your eye, which is directed at the camera viewfinder monitor, not the sun itself. During totality, zoom in and out once and also if you can, vary the exposure, either with the exposure setting or the shutter speed adjusted. Naturally, you will want to use the best videotape you can buy for the eclipse itself. A large water bottle hung under the tripod will make the flimsiest tripod a good deal better by adding mass. As always with exclipses, practice beforehand!

Note on monitors/recorders: I think anyone serious about "astro-video" should think about one of the tv monitors with a build-in vcr. This is excellent for display of live astro images at public events, and you can play tapes when you are clouded in. They come in 9-inch, 13-inch, and 20-inch diagonal tube sizes and are widely available. My Sony was purchased from New York-based Adorama for $1019. See my website for more information on black-and-white LLTV cameras, www.astrostock.com.

OCA GOES TO THE OC FAIR

by Jim Benet, OCA Outreach Coordinator

Orange County Astronomers took their telescopes to the Orange County Fair to give fair attendees a beautiful view of the moon. The viewing took place on Friday, July 16 and again on Wednesday, July 22. Hundreds of people came by to peer through a telescope -- many for the first time. Several people thought that they were seeing a picture instead of the real moon. They were totally amazed! During these evenings we handed out over 100 fliers describing the club.

Club members participating at the fair included Ken Baird, Paul Brewer, Franco Finizio, Henry Fry, Charles Gemma, Larry Haymes, John Kerns, Kevin Legge, Dave Radosevich, Gene Clinger, Paul Edward, Chris McGill, Liam Kennedy, Walt Goldy, Tony Bill, Rosie Walcek, and Jim Benet.

Getting to the site was a little bit of a hassle. They would not let us drive our vehicles into the park area. Instead we had to load our gear onto motorized, 4-wheel scooters. Then, of course, we had to unload and set up the telescopes. But the hassle was well worth the effort and they did provide electricity for us.

The area we were assigned to was surrounded by bright lights and trees. But that did not interfere too badly with the viewing of the moon. The moon was at a quarter-moon phase on Wednesday, which was perfect for viewing. You could see the shadows of the crater walls extending down into the basin. I spotted a long narrow fisher in one of the craters. This one can only be seen clearly during the first or last quarter phase of the moon when the shadows are right. (Photos by Jim Benet)

DID YOU KNOW……

The OCA has a Telescope Loaner program! This program is coordinated and very ably administered by Mr. Henry Fry, who collects and arranges for refurbishment of the club's telescopes. The telescopes, which are available for loan on a monthly basis, include the following: a 6-inch newtonian equatorial, an 8-inch newtonian equatorial, an 8-inch SCT, two 10.1-inch dobsonians, a 13.1-inch dobsonian, a 16-inch newtonian equatorial. All include several eyepieces and, for the equatorials, instructions as well. Any club member may borrow one of these telescopes for personal use. In the past, the OCA has unfortunately "lost" some of its scopes, and some very good ones, too. However, this is unlikely to occur while "Vigilante Fry" is at the helm: it's best to comply with the rules! Henry lives in Anaheim and can be reached at: 714-635-6056.---Editor

Virtual Astronomy

by Dave Kodama

This month it's time to "return home" and feature the OCA web site and member web sites. If you haven't visited the OCA web site for a long time, you'll notice quite few new features added by our webmaster (and now President) Russ Sipe. Besides regular updates of the home page with timely notices, we now have links to a chat forum area which includes a classified ad section. Also new is an informal poll area (send suggestions for polls to Russ), and new images continue to be added to our astroimage gallery. The astroimage gallery section, in particular, has steadily grown to the point where we may need to begin rotating images on a seasonal basis, but we're always looking for more OCA member photos. Contact gallery curator Aaron Imaoka at: imaokay@hotmail.com to submit images. All of the above are of course accessible through the OCA home page as listed on your Sirius Astronomer back cover.

In addition to all of the improvements listed above, I'm happy to be able to announce the latest online expansion, which is something I had been looking forward to for a long time – an online version of Chris Butler's "What's Up?" Lectures at:

http://www.sciencecenter.net/whatsup/

The address above is the direct link, but you will also be able to get there from the OCA home page. The final format of the site is still evolving at this time but will parallel what Chris presents at the monthly live versions of "What's Up?" So for those members who can't make it to the general meetings, you now have a way to catch Chris online. Chris also has many of his uniquely accurate astronomy paintings (as well as nature and maritime art) available for viewing at:

http://www.sciencecenter.net/butlerart/	Chris Butler's Gallery
http://www.novaspace.com/ORIG/Butler/Chrisorig.html	Nova Graphics Space Art Gallery

The first site is his personal gallery site, while the second is at Nova Graphics, a commercial space art gallery. You can also get to his personal gallery from the "Links of Interest" section of the OCA web site which features links to web sites of individual members:

http://www.chapman.edu/oca/otherweb.html

Other recent entries to the list of links on the OCA page are:

http://www.abmedia.com/astro/	Chris Cook
http://www.astroguy.com/	Jerry and Wanda Mulchin
http://www.thekennedys.net/Astronomy	Liam Kennedy
http://www.assa.org.au/	Astronomical Society of South Australia
http://w3.cs.com.uy/aaa/	La Asociacion de Aficionados a la Astronomia

Chris Cook's site features great astrophotos taken with the Televue 85mm refractor. Jerry and Wanda Mulchin's site is currently showing the progress on their "Nova Quest" observatory now coming up on the OCA Anza site. And Liam Kennedy's site shows that he's moved on from the QuickCam to the SBIG ST-7 CCD camera. The last two sites are sister club web sites in Australia and Uruguay, respectively.

If you (OCA members) have your own web site and it's not listed there, or your web site listing needs updating, please be sure to email me and I'll see that the list gets updated. The only thing we ask is that it be related to astronomy, of course!
Last of all, I want to remind you that if you are an OCA member, we are continuing to email out weekly reminders of upcoming OCA events. To get onto the distribution list, send an email request (which includes your full name) to me at: kodama@alumni.caltech.edu

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TIDBITS…

The Beginners' Class and the Astrophysics SIG meeting have a "new" meeting place: the Discovery Museum! Both groups will now be meeting in the building (not the trailer) on the same museum's grounds. Enter at the driveway immediately to the left of the trailer and park in the graveled area.---Editor

Book Review

by Gordon Pattison

Subrahmanyan Chandrasekhar. NASA Photo.

"Chandra: A Biography of S. Chandrasekhar", (1991) by Kameshwar C. Wali. Subrahmanyan Chandrasekhar (1910-1995) was an astrophysicist whose memorial will always be the "Chandrasekhar limit/mass", a term used by astronomers and their students throughout the world.

Born in India of a Brahman family that believed in education, he received his physics degree at age 19 and had a paper published by the Royal Society in London. It was during his ocean voyage to England that he calculated, at age 19, the limiting mass of a star which would allow it to end its life as a white dwarf. The limit was 1.4 solar masses. If a star exceeds that mass it becomes a neutron star or a black hole.

Attending Cambridge on a scholarship, he received his Ph.D. in astrophysics in June 1933. In October, he was elected a Fellow of Trinity College, which gave him 4 years of room and board and a salary of 300 pounds a year to conduct the research of his choosing. It was on the January 11, 1935 that Chandra gave his famous talk about the limited mass of white-dwarf stars before the Royal Astronomical Society in London. His paper was immediately attacked by Eddington, the leading British astrophysicist of the day, who believed that every star regardless of its mass became a white dwarf.

Because of Eddington's prestige, it took some 30 years for the full significance of the discovery to be recognized and the Chandrasekar limit to enter the standard lexicon of physics and astrophysics. "The moral," Chandra says, "is that a certain modesty of approach toward science always pays in the end. These people [Eddington, Jeans, Milne], terribly clever, of great intellectual ability, terribly perceptive in many ways, lost out because they did not have the modesty to say, 'I am going to learn from what physics teaches me.' They wanted to dictate how physics should be."

In the winter of 1935-36, he lectured at Harvard but was quickly offered a fellowship at Yerkes Observatory of the University of Chicago. This began his long association with the University of Chicago, which lasted until his death. Despite carrying a full teaching load, he was also managing editor of the Astrophysical Journal from 1952 to 1971. Highly respected throughout the world of astronomy and astrophysics he received some 20 awards which included sharing the 1983 Nobel Prize for research on the evolution of stars. It was an acknowledgment that came almost 50 years after his famous paper! This is a splendid biography by a professor of physics who knew Chandra well. You will meet many well known scientists and learn much about the ways of science.

August's Featured Speaker

Chris Butler
Science Illustrator
Staff Artist, Griffith Observatory

"Race to the Moon: the Untold Story"---Internationally-published science illustrator and author of an upcoming book on the Apollo lunar expeditions will share a "behind the scenes" look at the moon race. Drawing from many sources, Chris has compiled a narrative of the surprising twists and turns that led from Cape Canaveral to the Sea of Tranquililty. Why did the B-36 bomber help us get to the moon? How did John F. Kennedy choose such an ambitious space goal, when America had just 15 minutes' worth of space flight experience? Why did the builder of the Apollo command module try to "kill" the lunar module? Why did we stop going to the moon - and when could we be going back? Join Chris for a glass of Tang and a journey through space and time as he takes you on the Race to the Moon.

John Christopher "Chris Butler" is an space and science illustrator whose works have been published in Sky & Telescope, Omni Magazine, and thousands of other publications around the world. A graduate of the California State University of Fullerton's Television and Film school, Chris has served as a production designer for feature films, a technical artist, and financial analyst on the space shuttle program. Chris is a longtime OCA member, having served as vice-president and member of the Board of Trustees. He is known to most members as the monthly "What's Up" star lecturer.

Space Update

Gathered by Don Lynn from NASA and other sources

(To find out more on these topics, or those of past months' columns, through the World Wide Web, send your Web browser to our OCA website http://www.chapman.edu/oca/ and select Space Update Online.)

SOHO (SOlar and Heliospheric Observatory) - along with recent shuttle solar data, has solved another long-standing mystery. Flow of electrified particles from the Sun, called solar wind, has been known since 1962 to have two components: a high-speed one, in which particles move about 2 million miles per hour (mph), and a low-speed one, moving only 1 million mph. Scientists had been unable until now to explain how the high-speed component got up to such speeds. The Sun's corona, an extremely tenuous, electrically charged outer atmosphere, was found to have rapidly vibrating magnetic fields in it that form magnetic waves that accelerate the solar wind. The vibrating magnetic waves give solar wind particles a push, like a surfer riding an ocean wave. The shuttle solar data was collected by the Spartan spacecraft deployed and retrieved by the Space Shuttle during the recent STS-95 mission, the one that John Glenn flew. SOHO scientists have found how to effectively view the far side of the Sun. One SOHO instrument, called SWAN, is designed to observe ultraviolet emissions from interplanetary hydrogen. SWAN has found that active regions on the Sun project beams of emission out through this hydrogen, and the beams can be seen even while the active region is on the back side of the Sun. This discovery could be used to predict the solar storms that sometimes threaten Earth even while they are still on the back of the Sun, before they rotate into view.

Analysis of SOHO SWAN data has also discovered that comet Hale-Bopp cast a shadow almost 100 million miles long in the hydrogen emission, the longest shadow ever observed in the Solar System. Measuring the shadow allowed calculating the rate of emission of hydrogen and water from the comet, and it was found to be about 300 tons per second when the comet was near the Sun. The beams and shadows cannot be observed from Earth, or even in orbit about Earth, because tenuous hydrogen about our planet blocks the view. SOHO, however, is situated about 1 million miles sunward of the Earth at the LaGrange point there, and so is able to observe these phenomena.

Chandra (X-ray observatory) – was launched at 12:35a.m. July 23 from the Space Shuttle Columbia. The originally scheduled launch date, July 20, was scrubbed apparently due to what had been thought was a faulty hydrogen leak senser on Columbia. (NASA reported Sunday July 25, that as much as 2,500 lbs of hydrogen fuel may have leaked from one of the shuttle's main engines all the way into orbit.—Editor) This is the third in the line of Great Observatories, after the Compton Gamma Ray Observatory and the Hubble Space Telescope. Only the SIRTF infrared observatory remains to be launched in 2001 to complete the series. Chandra's highly elliptical orbit carries it 1/3 of the way to the Moon's orbit, to get it above the interference created by the Earth's Van Allen radiation belts. It is expected to last at least five years and to revolutionize X-ray astronomy. Chandra is the heaviest payload ever launched by the Shuttle. Commander of the Shuttle launching Chandra is Eileen Collins, first female shuttle commander.

Mars Polar Lander (MPL) - The possible landing sites for MPL have been narrowed to six, scattered about the south polar area, and all are being further studied with the best information from Mars Global Surveyor and previous missions. The landing site will probably chosen during a Site Review held this month. MPL was launched last January and is scheduled to touch down December 3.

Galileo (Jupiter mission) - performed a gravity slingshot by moon Callisto at the end of June, and will do two more on August 14 and September 16, all aimed at moving the low point of Galileo's orbit to the vicinity of Io. The spacecraft is taking advantage of the Callisto passes to study closely such mysteries as why the craters there seem to have been partially obliterated. Without Earth-like atmosphere and weather, there is no known mechanism for erosion of this magnitude. Callisto is the most cratered moon known, and is almost as large as the planet Mercury. Galileo has already begun passing into the Io torus, the doughnut-shaped cloud of electrically charged gas that surrounds Io's orbit. When it penetrates deeper, it will experience electric currents, magnetic fields, and charged particles of such strength that it may damage the spacecraft. Mission planners hope to pull off two close encounters with Io before this happens, so we can get a close-up look at this volcanic moon, and perhaps even fly through a volcanic plume. The Io encounters are scheduled for October 11 and November 26. The Io torus has been found to contain chlorine in observations made from Kitt Peak in Arizona. It was previously known to contain sulfur, oxygen, sodium, and potassium. The chlorine probably implies that ordinary table salt is present in the volcanic material thrown off by Io, or that salt is formed on the surface somehow. Because chlorine breaks up ozone, the high concentration of chlorine about Io probably means we will never find any ozone there.

Deep Impact (comet impact mission) - has been approved by NASA for launch in January 2004, leading to impact with periodic comet Tempel 1 on July 4, 2005. The mission is a spacecraft that splits in two parts near arrival at the comet, one part to smash into the comet and create a huge crater (estimated at 130 yards wide and 80 feet deep), while the second spacecraft component observes in visible light and infrared the impact crater and debris while flying by from a safe distance. Since comets are coated with a dark layer of modified (space-weathered) material, this plan gets through that layer to reveal what is in the interior, which is expected to be pristine material from the time of the formation of the Solar System. The results of the impact should be visible from Earth through small telescopes. Deep Impact is part of the Discovery series of low-cost missions.

Messenger (MErcury Surface Space ENvironment GEochemistry and Ranging) - has been approved by NASA for launch in spring 2004, for the second mission ever to the planet Mercury, which has not been visited since 1975. Messenger will carry seven instruments into orbit about the planet and will map it and study its shape, interior and magnetic field. The mission will have two gravity slingshots at Venus to shape the orbit toward Mercury, and then two more gravity slingshots at Mercury to change Messenger's orbit into one with minimal energy required to go into orbit. One mission goal will be to see if Mercury has ice in its polar craters, similar to the recent probable discovery of ice on our moon deep in its permanently shadowed polar craters. Even though Mariner 10 (the only previous mission there) flew by Mercury three times, all were when the same side of the planet was in sunlight, so Messenger will see the other side of Mercury for the first time. Messenger is also part of the low-cost Discovery series.

Discovery Series - What ever happened to those other Discovery Missions? 1) Lunar Prospector is still in orbit about the Moon after a great mapping and making several discoveries, has completed its mission, and will be commanded to crash into the Moon about the time you read this. The impact point is chosen at the purported ice discovered at the lunar South Pole, so is expected to splash detectable water vapor from the impact to confirm the ice. 2) You all saw the Mars Pathfinder and its rover, now both exhausted; they too were Discovery Missions. 3) NEAR (Near Earth Asteroid Rendezvous) failed to go into orbit about its target asteroid Eros, but will encounter it and try orbiting again next February. 4) Stardust (comet sample mission) is on its way to another resounding Discovery Mission success.

WIRE (Wide-field InfraRed Explorer) - The investigation is complete into the failure of WIRE shortly after launch, which was reported in this column in April. The design of the instrument's electronics box did not take into account subtle, but known, start-up characteristics of one component within the box. So when the electronics system was powered up, it briefly applied power to the explosive devices designed to remove the telescope's cover. Because this happened three days prematurely, the telescope pointed to the Sun during the time the cover was supposed to still be on, and this vaporized the frozen hydrogen inside, necessary for telescope operation. The venting hydrogen also sent the spacecraft into a spin that took some time to control. The investigators recommended for future spacecraft: independent inhibiting devices for explosive and mission critical devices, additional testing of start-up behavior, more detailed reviews of system designs, and consideration of the venting locations. WIRE as a spacecraft remains in control and working fine except for the telescope cannot function without the hydrogen. So major infrared astronomy from space will have to wait two years for the SIRTF infrared telescope.

Non-doomsday asteroid - After the announcement of another asteroid (named 1999 AN10) having a small chance of colliding with Earth in the future, two German amateur astronomers searched via the Internet the digital version of the Palomar Sky Survey for prediscovery pictures of the asteroid. Professionals had already searched the same survey, but had missed finding anything, probably due to inherently large uncertainties of positions of asteroids several years ago. The amateurs located an image from 1955, which allowed much greater accuracy in calculating its orbit (the longer the period of observation, the greater the accuracy). The result is that there is no chance that 1999 AN10 will hit Earth for many decades. It will come close on August 7, 2027, but not close enough to change its orbit such that it strikes the Earth either 12 or 17 years afterward, as originally thought.

Asteroids - A new study of asteroid rotation speeds shows that most elongated asteroids have a minimum rotation period consistent with their being loosely held-together rubble piles (which would break apart with faster rotation) rather than solid objects. One implication of this is that it should be common for such asteroids to break up into an asteroid with a satellite.

Goodbye Pete - Only 12 people ever walked on the Moon, and at least two of them lived here in Orange County. Sadly, one of those, Pete Conrad, died of injuries from a motorcycle accident in early July. His first words on the Moon were, "Whoopee! Man, that may have been a small one for Neil, but that's a long one for me." It was a joking reference to Armstrong's "one small step for a man", and the fact that the step down from the lowest rung on the lunar module to the Moon's surface was fairly large, particularly so since Conrad was shorter than Armstrong. Conrad's lunar mission was the one that precisely landed by the unmanned Surveyor and retrieved part of it to study the effects of long-term exposure to deep space. Pete's skills, leadership, and humor will be greatly missed.

From the OCA Board of Trustees

The good news is that OCA is the largest local astronomy club in the country. That's good not because it gives us bragging rights, but because it means that we have the human and financial resources to have a genuine positive impact on the science and hobby of astronomy. Our twenty-acre observing site near Anza (only 12 miles from the famed Palomar Observatory, sharing many of the same quality observing conditions) is one of the finest amateur observing facilities in the country. Additionally, OCA's base of operations, Orange County, is one of the wealthiest and most influential counties in the country in terms of space and astronomical resources. On top of all this we, along with all astronomy clubs, are experiencing unprecedented interest in astronomy by the media and the public. We are in many ways in the astronomical catbird's seat.

The bad news is that our tight budget prevents us from funding the kind of efforts that capitalize on these happy circumstances. Whether it be hardware/software for serious science research at our observatory, or multimedia presentation equipment for our education and outreach programs, or a dozen other worthy expenditures, we don't have income necessary to move forward in a positive way to advance the causes of astronomy in Orange County in the way we would like. As mentioned in my August president's letter there has been a graying trend in our hobby. The number of new young amateur astronomers entering our ranks is smaller than the number we lose each year. The schools have not done the job, nor do they intend to do the job of presenting a full blown introduction to astronomy, especially observational astronomy. That is our job. And we have been doing the best we can. However there is so much more we could be doing with proper funding.

We have an impressive list of accomplishments, all of them having been achieved in the face of increased operating costs and no corresponding increase in dues. Our cash reserve is less than it was ten years ago. It is time to remedy that situation. Therefore, for our future, and for the future of world class astronomical research and education in Orange County through the auspices of OCA , we find it necessary to raise our annual dues. OCA basic annual dues will be raised to $50 (a tax-deductible donation) beginning with October signups and October renewals. Special membership rates will increase to $30 (students, juniors, retired, cyber-members). Additional family members' rate will be $7. Lifetime memberships will increase to $500 beginning October 1st. Star Member (one time only) fees will remain at $150. Pad fees will increase to $50 and observatories to $100.

At less than a quarter of the cost of a decent eyepiece per year, your OCA dues will not only secure for yourself all the benefits of OCA membership (e.g. newsletter, loaner scopes, two observing sites, telescope pad leases, library, special interest groups, and much more), it will also help fund OCA's growing commitment to astronomical research and educational outreach. Thank you all for your support.

Photo by Dave Kodama.

ASTROLLANEOUS

Announcement from Jay Glowacki, OCA Vice President:

We are planning a program dedicated to the August 11 total solar eclipse and members' travelogs. OCA'ers will be on cruises off the east coast of Canada and the Black Sea, and traveling on land in Austria, the Czech Republic, Italy, Turkey, Iran and who knows where else! If you are one of the many OCA members with the opportunity to be in the right place at the right time for this event, consider taking a few photos, slides, sound recordings, or video shots that would be of interest for presenting to the group. While eclipse shots are sure to be recorded, as well as are tourist attractions, the ambiance of the surrounding area before, during and after the eclipse is sometimes overlooked. For those of us who can't go, this will give us at least a secondhand experience. For those who did go, it's a chance to show off and share your experiences.

Recent astronomical discoveries:

July 13 saw the announcement of both a nova and a comet. Nova Aquilae is an 8th magnitude object discovered by Akihiko Tago of Tsuyama, Japan on unfiltered Tmax-400 film taken with a 55-mm f/3 camera lens. The object is located at RA 19^{h}07^{m}40^{s}, +12^{o}31'26.2". Spectral observation indicated the presence of strong, broad H-alpha and H-beta lines.

Also on July 13, Daniel Lynn of Melbourne, Australia discovered an 8th magnitude comet (C/1999 N2) while using 10x50 binoculars. The comet, discovered in the constellation Hydra at 10arcmin/hr, has now moved into the constellation Sextans. It has a fairly dense coma of diameter 2 arcmins and a tail of about 20 arcmins, according to observational reports.

Fall semester online college astronomy course:

This Fall, a totally online, introductory astronomy course, Astronomy 1, is being offered through L.A. Mission College in Sylmar. The course earns 3 college credits which are transferrable to the UC and Cal State systems, and to U.S.C. The website for course information is: http://www.lamission.cc.ca.us/physics/astrotest/astron.html. Lessons can be arranged for the student's convenience, anytime day or night. For more information, contact Professor Richard Rains by email at: rerains@earthlink.net.

Humor---Ten Things to do with your Finderscope after you've gotten a Telrad:

10. Use it to fry ants
9. Attach it to a GOTO base and sell it as an "ETX-90/Plus"
8. Poke out the objective and use the tube as a beer stein
7. Poke out both lenses and use the tube as an exhaust extension on your Harley
6. Doorstop
5. Paperweight
4. Collect a bunch from your friends and make a mobile
3. Give it to your wife to use as a rolling pin
2. Observe your mother-in-law through the wrong end to make her look far away.

And the #1 thing to do with your finderscope after you get a TELRAD...

1. Scuff up the eyepiece crosswise with steel wool and presto! You've got a spectroscope!

SIRIUS ASTRONOMER

NEWSLETTER OF THE
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